METHYL ETHYL KETONE

Methyl ethyl ketone is a federal hazardous air pollutant and was identified as a toxic air contaminant in April 1993 under AB 2728.

CAS Registry Number: 78-93-3 $C_2H_5COCH_3$

Molecular Formula: C_4H_8O

Methyl ethyl ketone is a flammable, colorless liquid with an acetone-like, sweet, pungent odor. It is soluble in four parts water and miscible with alcohol, ether, acetone, and benzene. It is lighter than water and may be expected to float while rapidly dissolving (HSDB, 1991).

Physical Properties of Methyl Ethyl Ketone

Synonyms: 2-butanone; ethyl methyl ketone; MEK; 2-oxobutane

Molecular Weight:	72.10
Boiling Point:	79.6 ^oC
Melting Point:	-86.35 ^oC
Flash Point:	-6 ^oC (21 ^oF) (closed cup)
Vapor Pressure:	90.6 mm Hg at 25 ^oC
Vapor Density:	2.41 (air = 1)
Density/Specific Gravity:	0.805 at -20/4 ^oC (water = 1)
Log/Octanol Partition Coefficient:	0.29
Henry's Law Constant:	1.05 x 10^{-5} atm-m^3/mole
Conversion Factor:	1 ppm = 2.95 mg/m^3

(HSDB, 1991; Merck, 1989; Sax, 1989; U.S. EPA, 1994a)

SOURCES AND EMISSIONS

A. Sources

Methyl ethyl ketone is used as a solvent for lacquers, adhesives, rubber cement, printing inks, and paint removers, in cleaning solutions, as a catalyst, and as a carrier. Cigarette smoke and gasoline exhaust are also sources of methyl ethyl ketone. Methyl ethyl ketone has been detected or quantified in motor vehicle exhaust by the Air Resources Board (ARB) (ARB, 1995e).

The primary stationary sources that have reported emissions of methyl ethyl ketone in

California are millwork, veneer, and plywood manufacturers, manufacturers of wood furniture, and manufacturers of rubber and plastic footwear (ARB, 1997b).

B. Emissions

The total emissions of methyl ethyl ketone from stationary sources in California are estimated to be at least 290,000 pounds per year, based on data reported under the Air Toxics "Hot Spots" Program (AB 2588) (ARB, 1997b).

C. Natural Occurrence

Methyl ethyl ketone occurs naturally in volcanos, forest fires, products of biological degradation, and is a natural component of food (Howard, 1990).

AMBIENT CONCENTRATIONS

Methyl ethyl ketone is routinely monitored by the Air Resources Board statewide air toxics network. The network's mean concentration of methyl ethyl ketone from January 1996 to December 1996 is estimated to be 0.32 micrograms per cubic meter ($\mu g/m^3$) or 0.11 parts per billion (ppb) (ARB, 1997c).

The United States Environmental Protection Agency (U.S. EPA) has also compiled ambient concentration data for methyl ethyl ketone from several locations throughout the United States from 1972-87. A mean ambient concentration of 1.4 $\mu g/m^3$ (0.47 ppb) was derived from these data (U.S. EPA, 1993a).

INDOOR SOURCES AND CONCENTRATIONS

No information about the indoor sources and concentrations of methyl ethyl ketone was found in the readily-available literature.

ATMOSPHERIC PERSISTENCE

If released to the atmosphere, methyl ethyl ketone will exist primarily in the gas phase. The dominant tropospheric loss process of methyl ethyl ketone appears to be reaction with the hydroxyl (OH) radical, with photolysis being unimportant. The calculated half-life and lifetime of methyl ethyl ketone due to reaction with the OH radical are 9 days and 13 days, respectively. The products of the OH radical reaction are acetaldehyde, formaldehyde and, in the presence of nitrogen dioxide (NO_2), peroxyacetyl nitrate (PAN) (Atkinson, 1994).

AB 2588 RISK ASSESSMENT INFORMATION

Although methyl ethyl ketone is reported as being emitted in California from stationary sources no health values (cancer or non-cancer) are listed in the California Air Pollution Control Officers Association Air Toxics "Hot Spots" Program Revised 1992 Risk Assessment Guidelines for use in risk assessments (CAPCOA, 1993).

HEALTH EFFECTS

Probable routes of human exposure to methyl ethyl ketone are inhalation, ingestion, and dermal contact (Sittig, 1991).

Non-Cancer: Exposure to methyl ethyl ketone vapors can cause eyes, nose, throat, and respiratory tract irritation. Methyl ethyl ketone is a central nervous system depressant. Methyl ethyl ketone enhances the neurotoxicity of n-hexane (U.S. EPA, 1994a).

The U.S. EPA has established a Reference Concentration (RfC) of 1.0 milligram per cubic meter for methyl ethyl ketone, based on decreased fetal birth weight in mice. The U.S. EPA estimates that inhalation of this concentration or less, over a lifetime, would not likely result in the occurrence of chronic, non-cancer effects. The U.S. EPA has established an oral Reference Dose (RfD) for methyl ethyl ketone of 0.6 milligrams per kilogram per day, based on decreased fetal birth weights in rats. The U.S. EPA estimates that consumption of this dose or less, over a lifetime, would not likely result in the occurrence of chronic, non-cancer effects (U.S. EPA, 1994a).

No information was located on adverse reproductive effects of methyl ethyl ketone in humans. Retardation of fetal development and fetal malformations were reported in mice exposed to methyl ethyl ketone by inhalation (U.S. EPA, 1994a).

Cancer: No information is available regarding carcinogenic effects in humans from exposure to methyl ethyl ketone. The U.S. EPA has placed methyl ethyl ketone in Group D: Not classifiable as a carcinogen, based on lack of data in humans and animals (U.S. EPA, 1994a). The International Agency for Research on Cancer has not classified methyl ethyl ketone for carcinogenicity (IARC, 1987a).